name of "Butterine." He also stated that his method of analysis was one unknown outside the Inland Revenue laboratory, and that the only test on which he placed much reliance was the specific gravity of the fatty matter, whilst he had been unable from the few experiments he had made to corroborate the statement of Messrs. Hehner and Angell, that genuine butter fat never yields more than about 86 per cent. of fatty acids on saponification.

Although the case could not be reopened, the evidence of several Public Analysts who had examined the sample was taken, and in most respects distinctly showed that the secret method of examination adopted by Mr. Bell was utterly unreliable. Dr. Dupré, F.R.S., Mr. Wigner, and Mr. de Konigh each found that the butter-fat contained close upon 94 per cent. of fatty acids, genuine butter not yielding more than 86, and ordinary fats giving about 95 per cent. On microscopic examination a crystalline structure (evidence of fusion) was noticeable; the melting point was 4° C. lower than genuine butter; the matter mistaken by Mr. Bell for caseine was no such substance, but only fragments of woody tissue and similar vegetable organised matter; the physical structure of the substance was different from that of genuine butter, as it possessed on the tongue the peculiar granular feeling of "butterine," and also tasted like the latter. The same results were also arrived at by other analysts, six having examined the sample, and all agreeing with Dr. Muter that the substance contained either no butter at all or very little.

On the other hand, Mr. Harkness and Mr. Lewes (assistant to Mr. Bell) stated that they could see no crystals under the microscope, but admitted that woody fibre and other vegetable matter was present.

Finally, the case was dismissed, the Vestry being ordered to pay the costs of the Somerset House analysis; the magistrates, however, consented to grant a case for appeal if the Vestry desired to adopt that course.

Comment on the above would seem almost superfluous; but the question naturally arises, of what use is it in Government taking up valuable time in passing Acts, and in counties, districts, and parishes going to the expense of appointing analysts in accordance with these Acts, if the operations of these gentlemen are to be rendered nugatory by being liable to be overthrown by appeal to an authority which, however competent in reference to its own particular department, is nevertheless by its own showing scarcely possessed of sufficient experience, and is certainly not of sufficient standing and position to be admissible as a final adjudicator on such matters? The position of Public Analysts was surely bad enough without this indignity and injustice; most of the offices are grossly underpaid; the appointments are often in the hands of persons utterly incompetent to judge of the respective merits of candidates, and who not infrequently elect, not the applicant of highest scientific and professional standing, but the one who sinks his self-respect lowest by canvassing and flattering the electors. As a consequence many of the best known chemists refuse to have anything to do with such appointments, and the public loses the chance of valuable services. Further, when mistakes and blunders are made by persons who never ought to have been elected at all, there is a general cry against "the incompetence of Public Analysts," and discredit is brought on the whole class, worthy and unworthy alike. The inevitable results of insisting upon the analysts of Somerset House or any other set of men (unless specially trained and adapted for such a position) being made referees whose decisions shall override the results of careful and conscientious chemists, will be that the best and most accurate work of the Public Analysts will be wasted, that they themselves will be brought into contempt, that many of the best of them will be forced to resign their appointments, and finally, that the Act will become to a great extent a dead letter.

HARTLEY'S "AIR AND ITS RELATION TO LIFE"

Air and its Relation to Life. By Walter Noel Hartley, F.C.S., Demonstrator of Chemistry, and Lecturer on Chemistry in the Evening Class Department, King's College, London. (London: Longmans, Green, and Co., 1875.)

OF all the so-called improvements which have been effected from time to time in the means by which we make ourselves comfortable and render ourselves independent of the limitations which nature would impose upon us—perhaps the introduction of gas was hailed and has been looked upon as among the greatest. It wants but little experience, however, of the manner in which people live in towns, to convince us that the reverse of this is the case, and that the pain and misery which it has been the means of inflicting must far outweigh its advantages. If anyone doubts this let him examine his sensations in a morning, after having spent the previous evening in a close room blazing with gas, and compare them with what he feels after having spent the corresponding hours in the open air, or in a fresh room moderately lighted with oil or candles. There are but few people to whom such experience would not show that the effect of the gas was a feeling of lassitude and depression, if not a downright headache; and if they were to repeat the experiment, who would not suffer a general loss of tone. Yet wherever gas is to be procured this is precisely the misery to which people subject themselves. In nine out of ten houses in the neighbourhood of towns, if one goes from the fresh air into a room in which the people are sitting on a winter evening, the first breath is enough to suffocate one, and yet the people within the room are entirely unconscious; they may be more or less restless and depressed, but as this is their normal state they do not recognise the cause. In this way, to say nothing of what takes place in theatres and places of amusement, the evils which gas is answerable for are incalculable, though if they could be estimated they must far outweigh the blessings which accrue from the abundance and cheapness of its light.

The fact is that the money cost of the fuel forms only one part of the expense of light; there is the consumption of oxygen, and in this gas is very extravagant; so that although we now obtain tenfold the light in our rooms which we had before the introduction of gas without any increase of expense in money, we have to pay for it by a tenfold vitiation of the air. Three or four gas flames consume as much air as a moderate fire, yet who would live in a room with a fire or even a pan of charcoal without a chimney. Yet it is a common thing to go into a room in which three, four, or five gas flames have been burning for hours without either door or window having been open; that the people who live in these rooms escape the evil effects is not to be supposed. The only thing is that they have not sense or courage enough to trace the effects to their cause. Rather than give up their warmth and light they wilfully close their eyes to what follows. When people inflict these miseries on their friends, whether consciously or not, they become a positive nuisance, and are fit subjects to be dealt with by the sanitary inspector. To have to dine with them is a punishment: a headache is sure to follow, however abstemious one may be.

Many of these people are doubtless innocent, but there are those who know the evil, yet who do not make any attempt to remove the cause. They have only to turn down the gas. But no; they clamour for what they cannot get—good ventilation with the gas—and numberless are the quack remedies which one sees applied. But whether impossible or not, it is certain that at present there is no proved means which will supply sufficient air, free from draughts, to keep a room blazing with gas decently fresh. It may be that in time, when the clamour of quacks has sufficiently subsided to allow the voice of reason to be heard, some method of constructing houses with chimneys for gas may be introduced which will allow of all the desired warmth and light, and at the same time ensure a sufficient supply of fresh air. But in the meantime, the obvious remedy is to forego some of the luxuries, to be content with moderate light and warmth, and to set off against the evils (mostly fancy), which arise from occasionally opening a window, the certain and disgusting effects of sitting in a closed room.

The effect of gas is not the only evil to be remedied by improved ventilation. Modern science has brought to light things concerning the origin of disease of which our fathers never dreamed, and which must render people dissatisfied with the state in which they live. But to do this they must be known. Ignorance, if it is not the sole cause of the evils which people inflict on themselves, is at least their excuse. As a rule people have much more faith in what is told them with authority than in that which they themselves dimly perceive, and hence it does not follow that because the evidence of their noses has been disregarded that the voice of a prophet will not be listened to. Unfortunately, the subject of practical ventilation is one which by reason of its complexity has offered little attraction to scientific men, and consequently has been much neglected. It was therefore with great pleasure that we received the work before us. Written in ordinary language, and in a very clear style, this little book contains an account of all that has been done in the way of scientific research on the relation of air to life. It is written from a scientific point of view, but no pains have been spared to trace the possible applications of the science and the practical lessons which may be learnt from it. It is just the book for those who, without any particular chemical or physical training, have undertaken the control of sanitary matters.

In the first two chapters the author gives a very interesting historical sketch of the discovery of the constituents of the atmosphere, in which the experiments which have led to the various discoveries are not only described, but illustrated by very perfect drawings, and thus the reader is conducted by easy steps to a very complete view of the subject, including the most recent discoveries. A very full account is given of the amounts (and the means of determining them) of ozone, carbonic acid, and the organic impurities in the air at different times and in different places. The degree of accuracy to which this class of research has been carried is very striking. Dr. Angus Smith has examined the air under almost all conceivable circumstances, and his methods will compare in delicacy with the sense of smell. Thus in place of our impressions, we have now definite chemical proof as to the degree of impurity in the air which produces evil effects.

Having given tables of the amounts of carbonic acid to be met with in closed places, the author proceeds:—

"Here it is easily seen that the air in the theatres is very bad; but after the doors had been open for a short time between the acts it rapidly improved; indeed, in Covent Garden, in the second case, near an open door, the people exclaimed, by force of contrast, how delightful the fresh air was; nevertheless, this *fresh air* contained 14·8 parts of carbonic acid in 10,000, or from 2½ to three times as much as it should have had. Drury Lane was the first place experimented on; and having entered at the commencement of the performance, the bad effect of the air as it became vitiated was only gradually experienced, but it produced a listlessness and headache. All the audience around were evidently affected in the same manner, and appeared to be constantly sighing and gaping, or, in other words, gasping for breath."

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"The bad effect of carbonic acid in the air alone, without taking into account organic matter, has been shown by Dr. Angus Smith, who ascertained that one part of the gas in 1,000 of air produced in fifteen minutes an increase in the number of respirations from eighteen to nineteen per minute, which increase remained the same up to forty-five minutes; the pulse was lowered in twenty-five minutes from seventy-three to seventy-one beats; while at forty-five minutes it was seventy-two per minute. With 2½ volumes of carbonic acid in 1,000 of air the pulse at first seventy, increased to seventy-three at the end of ten minutes, and at the end of half-an-hour was lowered to sixty-nine, while the respirations increased from seventeen to twenty-one per minute. With five volumes of carbonic acid the pulse at first seventy-six and the inspirations seventeen, at the end of forty minutes were represented by the numbers seventy-one and twenty-four."

The results of this research, therefore, fully bear out the conclusions of experience as to the evils of our present system of lighting our dwellings, and it is to be hoped that, supported by this authority, people will no longer snub their noses and disregard their evidence.

The author then goes on to discuss the laws relating to the motion of gases, and to detail what little is known as to the best means of getting the air into and out of our rooms. He calls attention to the very striking result of some experiments (Pettenkofer's) as regards the quantity of air which passes through the solid walls of a room; and he finishes the chapter by pointing out how in our badly-constructed houses we are drawing poisonous air into them from the ground on which they are built, and the drains beneath them.

The latter part of the book is devoted to setting forth the results of the researches of Dr. Angus Smith, Pasteur, and others, on the power of the air to suspend and transport living germs, and the many important lessons with which the subject is fraught. This subject has already been so much discussed in the columns of NATURE, that is not necessary to enlarge upon its importance in this review. Suffice it to say, that a knowledge of it is essential to the comprehension of the full importance of having pure air within our houses.

In conclusion, we strongly recommend the book, which, while it contains all the information to be obtained, sets forth nothing but what is based on sound principles, advocates no hypothesis, and in no way attempts to disguise the difficulties and imperfect state of our knowledge of the subject. OSBORNE REYNOLDS

THE RECENT ORIGIN OF MAN

The Recent Origin of Man, as illustrated by Geology and the Modern Science of Prehistoric Archæology. By J. C. Southall. 8vo. Pp. 606. (Philadelphia: J. B. Lippincott and Co.; London: Trübner and Co., 1875.)

THE work published under this title is a laborious compilation of heterogeneous materials derived from history, archæology, and geology, in which the writer attempts to prove "that primeval man commenced his career six or eight thousand years ago in a civilised condition in the temperate regions of the East." In it the irresponsible dicta of anonymous journalists, and the records of local societies in America, Britain, and France, unchecked by criticism, are taken to be of equal value with those facts which have run the gauntlet of the criticism of the civilised world, and not been found wanting. A work written in this manner must necessarily be a huge pile of wheat and chaff, in which the former can only be got at by a process of careful winnowing. In this particular case we fail to discover any wheat which has not been taken out of somebody else's barn.

Mr. Southall tells us, in his preface, that he is the champion of the Bible against the speculations of "Science," and that as such he is very much hurt "that many literary and scientific men should avoid mention of the Hebrew Scriptures." "I do not recollect," he writes, "that 'The Antiquity of Man' even recognises that the Book of Genesis is in existence; and yet every one is perfectly conscious that the author has it in mind and is writing *at* at it all the time." This quotation illustrates the spirit of the book and the one-sidedness of the writer. Why should Sir Charles Lyell include Genesis among his geological evidences as to the antiquity of man, and enter into the barren discussion which has been before the world for the last half century? Mr. Southall does not recognise the fact that even if he proves scientific men to be wrong he does not add to the authenticity of the Scriptures, or that even if man be but six or eight thousand years old, that fact again is a point of small importance, except as relates to Archbishop Usher's chronology. We for our part protest against the assumption in this work that there is any real antagonism between religion and science, and we believe that its writer has contributed perhaps the most elaborately untrustworthy contribution to a dead controversy which has yet been made; for in it are involved, as in a great whirlpool, facts relevant and irrelevant—every waif and stray, in fact, that has come within its reach. And these are carried round so swiftly that it is almost impossible for the reader to see clearly whither the argument is tending. Of course Mr. Darwin and the doctrine of evolution are drawn in, which the author takes to imply "that Napoleon Buonaparte was evolved from a Corsican crab," and which we respectfully decline to discuss in this connection.

In the attempted proof of man's recent origin, Mr. Southall first of all appeals to history. The records of Phœnicia, Babylon, and Egypt go back some three thousand years, more or less, before Christ, and civilisation then was as complete and elaborate as it was at any subsequent time. He argues that there is no graduated process from the savage state in any of these cases, and "that there is not a particle of evidence that man in his earliest seats in the East was a savage." He then asks (it may be jocularly), "Did the pyramids and the Chaldæan astronomy emerge from the Danish Kjokkenmöddings abruptly and instantaneously?" It is certainly true that we have not yet discovered any proof of the gradual development of the arts and of civilisation in those comparatively inaccessible regions, not necessarily because they do not exist, but because the exploration has been imperfect. In them there may be, and probably are, treasures to be revealed by the pickaxe and spade quite as rich as those of Hisarlik, and showing as complete a sequence. The statement that no traces of a rude and imperfect civilisation have been met with in the East is refuted by the discovery of enormous quantities of flint implements in Egypt and of Neolithic axes in Asia Minor and in India. In the river gravels of both these regions Palæolithic *hâches* have been found of the same type as those of Amiens and Abbeville. In the face of testimony of this kind he assumes that there are no traces of savagery, and accounts for the ancient civilisations by the supposition that they were inherited from the antediluvian world through Noah and his sons, and that the long-lived patriarchs were, by virtue of their experience, "very remarkable men." We would hand over this argument as it stands to Mr. Galton, for use in his next edition.

Having fixed the age of the most ancient peoples known, including the Chinese, by an appeal to history, the author assumes that the ancient inhabitants of Western Europe, whom he admits to have been savages, were descended from the same stock as the Babylonians, Egyptians, and Chinese, and that the date of the former is identical with that of the latter—a statement which is equivalent to the saying that children of the same father are always of the same age. Before we leave this part of the work behind, we would remark that Mr. Southall gravely tells us, that Central America had been visited by the Chinese, Japanese, Irish, and Welsh before the voyage of Columbus, as if these were well-authenticated facts. He evidently believes in the Irish legends, and in the story of Prince Madoc.

If, however, history fares badly at the hands of Mr. Southall, archæology fares worse. He devotes one chapter to the "premature announcements of Science with regard to the antiquity of man," in which such statements as the existence of a race of pigmies in Tennessee, proved from the small graves, the presence of man in the Pleiocene age, based on the perforated sharks' teeth in the crag of Norfolk, the asserted discovery of a fossil man in